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O'Neal

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(54) **ANTENNA MOUNTING ASSEMBLY FOR A VEHICLE WITH A SLOPED BODY PANEL**

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H01Q 1/32 (2006.01)

(52) **U.S. Cl.**
CPC ***H01Q 1/12*** (2013.01); ***H01Q 1/3258*** (2013.01)

(58) **Field of Classification Search**
CPC H01Q 1/12; H01Q 1/3258
See application file for complete search history.

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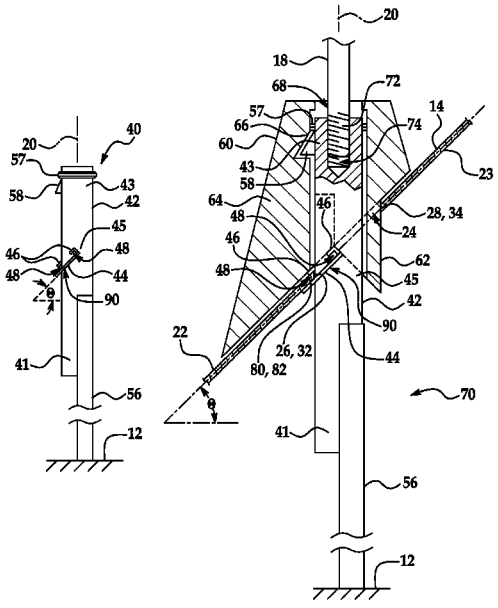
(57) **ABSTRACT**

Embodiments are provided of antenna mounting assemblies and vehicles that include such assemblies. In one aspect, an antenna mounting base for supporting a vehicle antenna with respect to a vehicle body panel that defines a panel aperture comprises: an antenna mounting portion; a flange extending from a surface of the antenna mounting base; and at least one tab defining a recess with the flange, the recess being sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture.

17 Claims, 6 Drawing Sheets



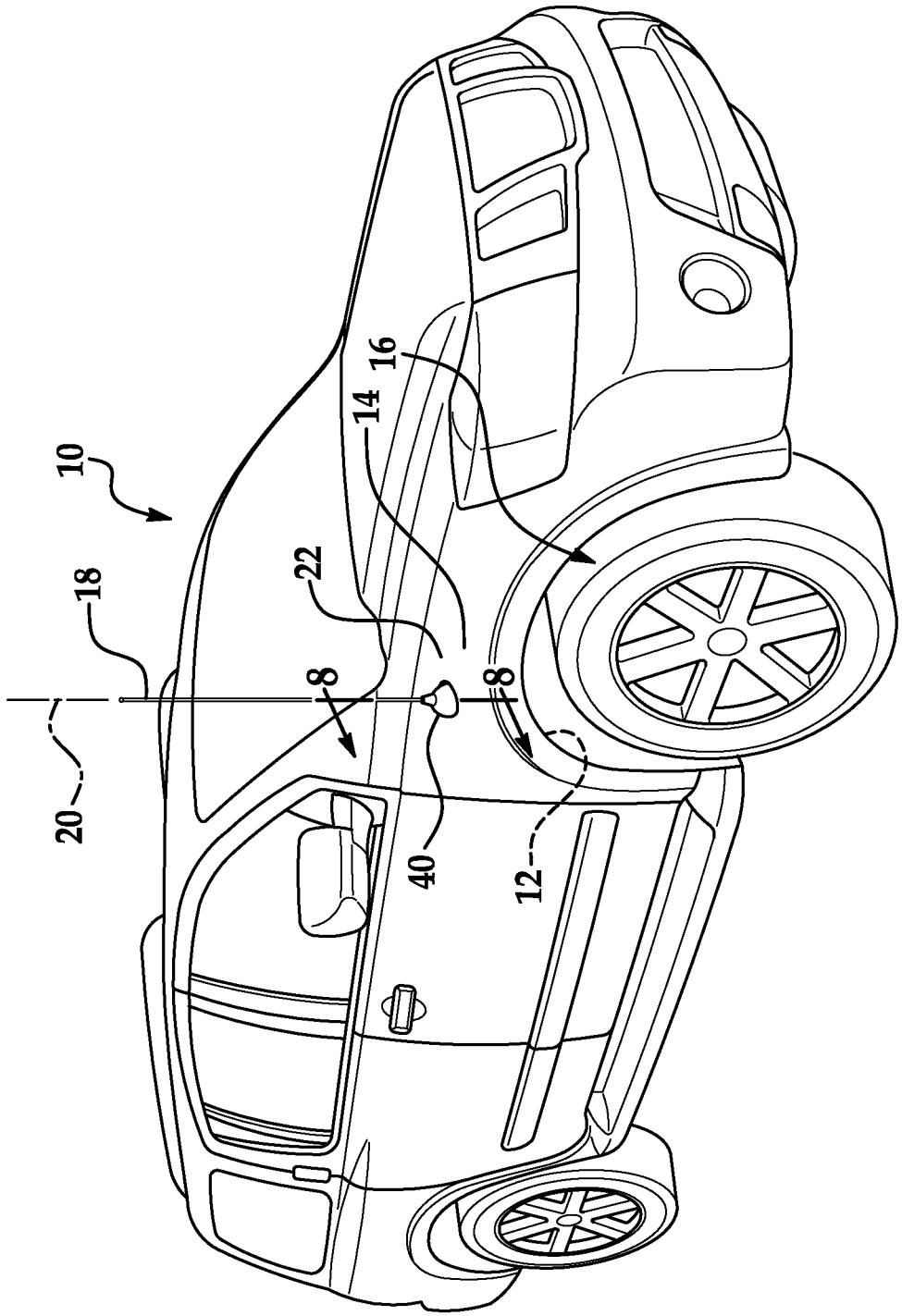


FIG. 1

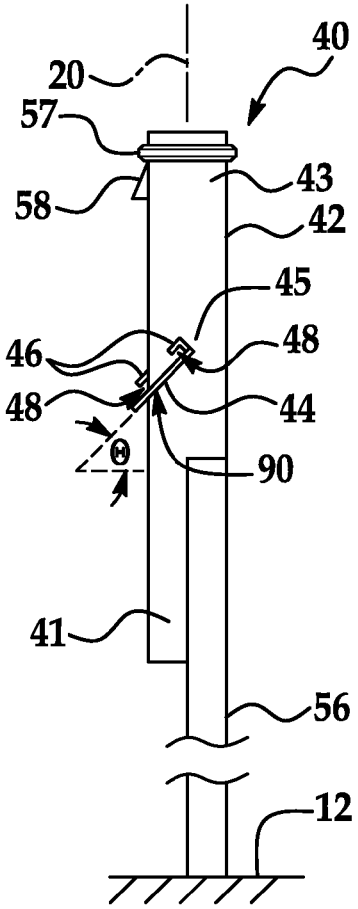


FIG. 2A

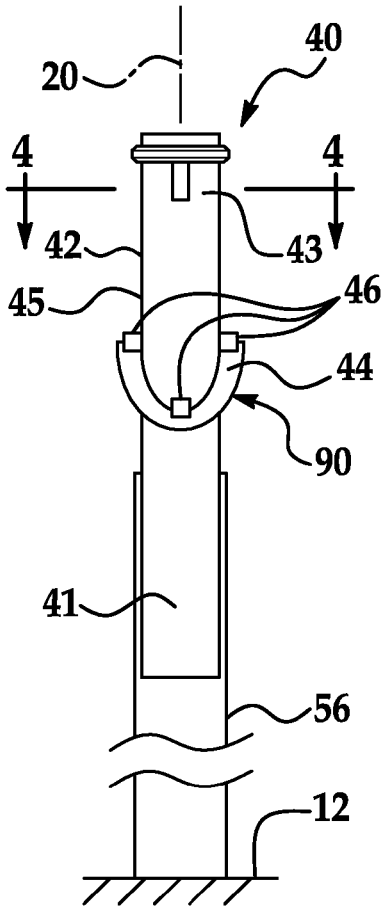


FIG. 2B

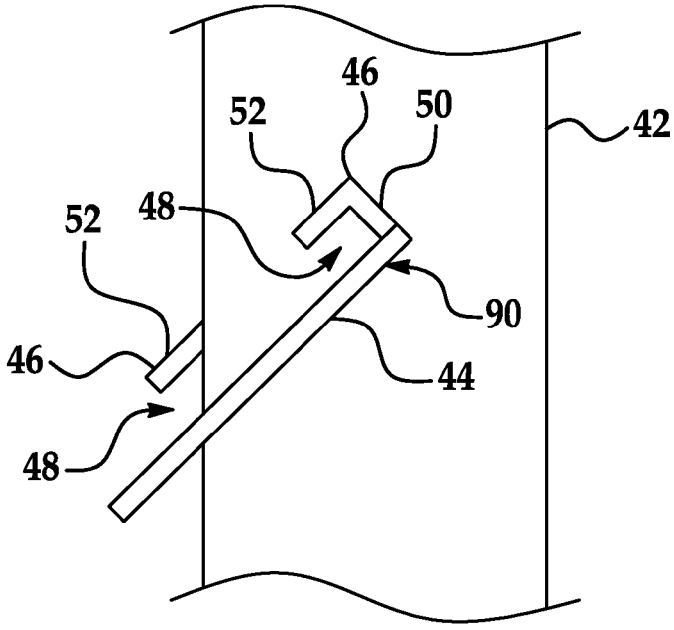


FIG. 3

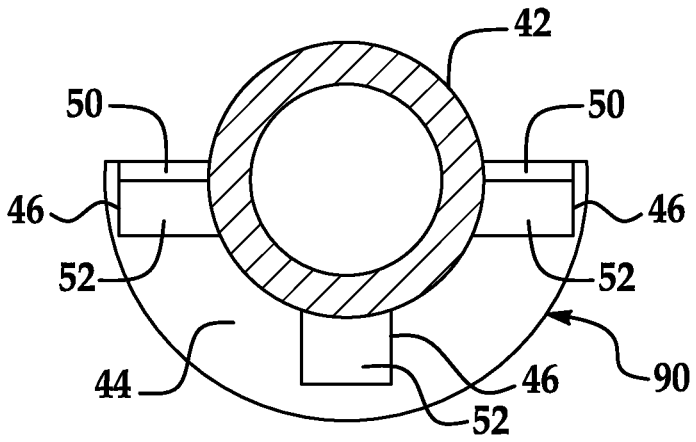


FIG. 4

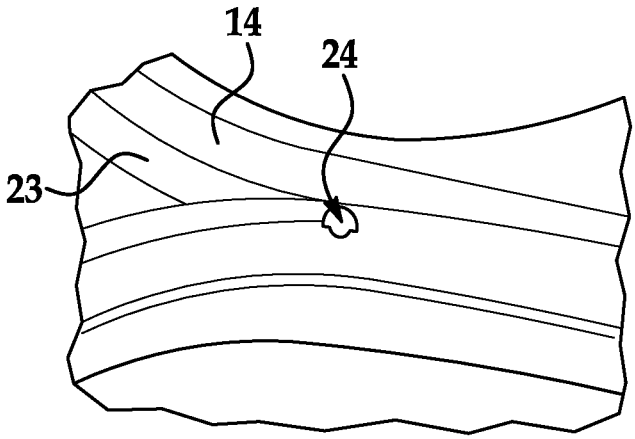


FIG. 5A

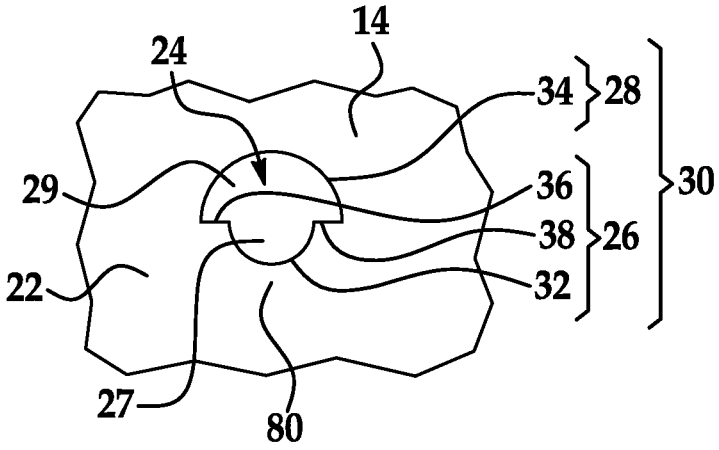


FIG. 5B

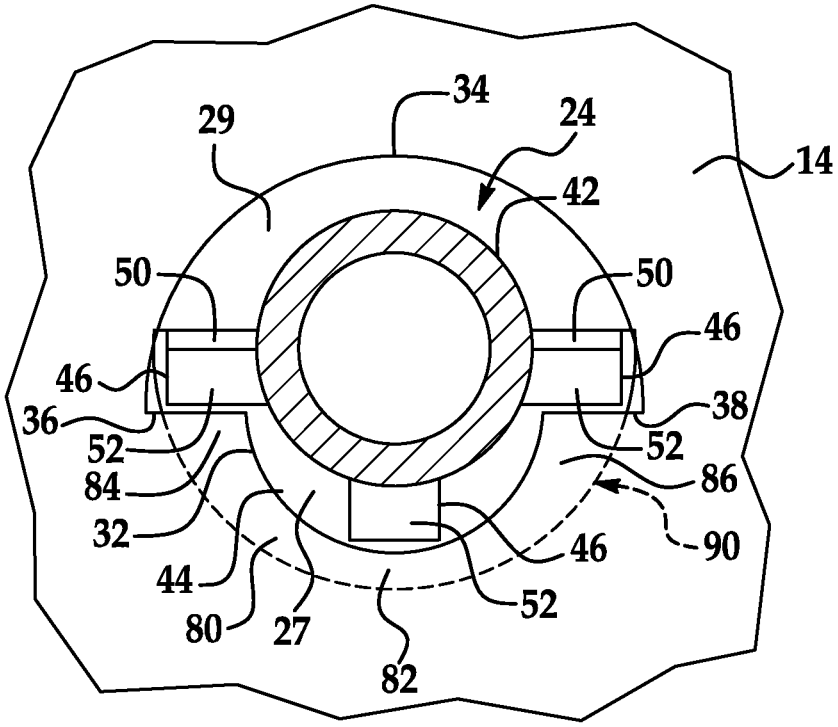

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FIG. 6A

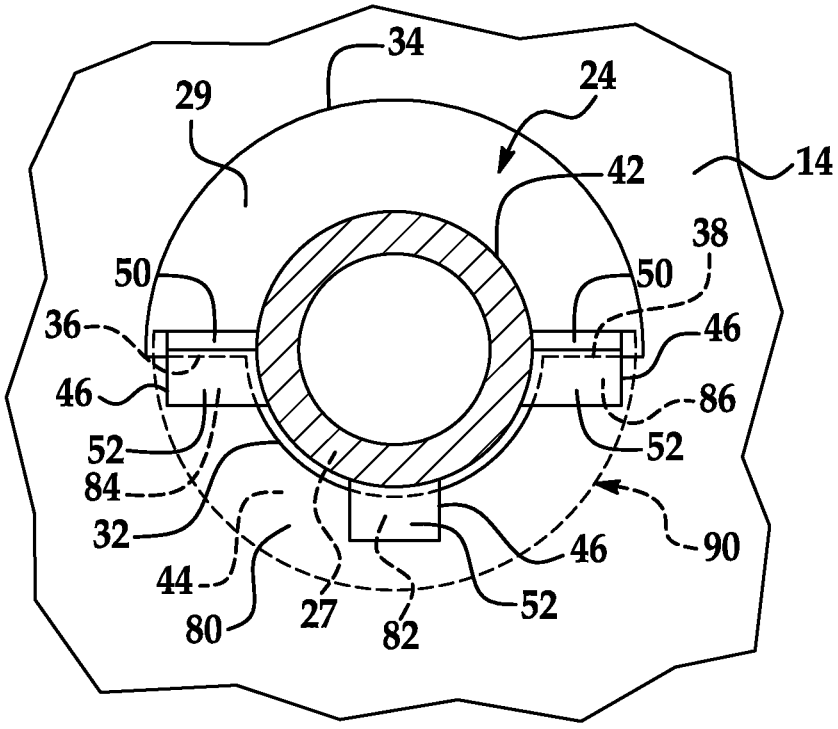
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FIG. 6B

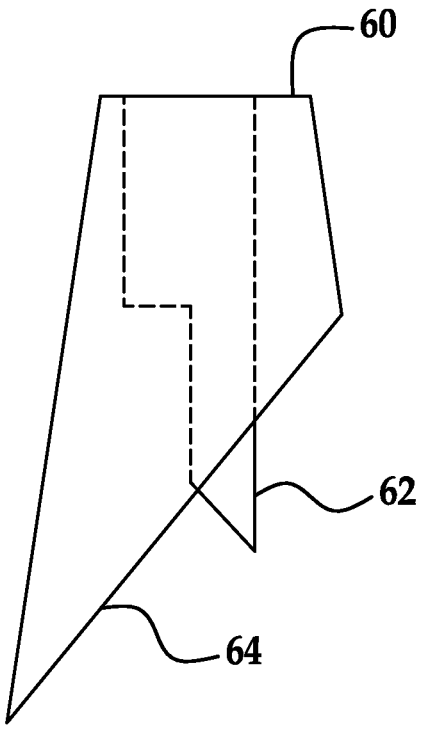


FIG. 7A

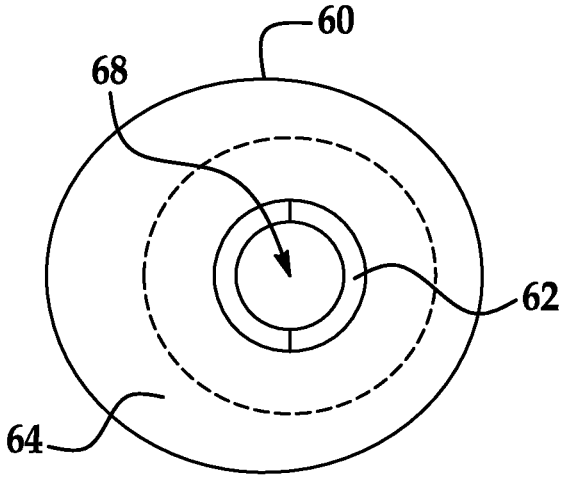
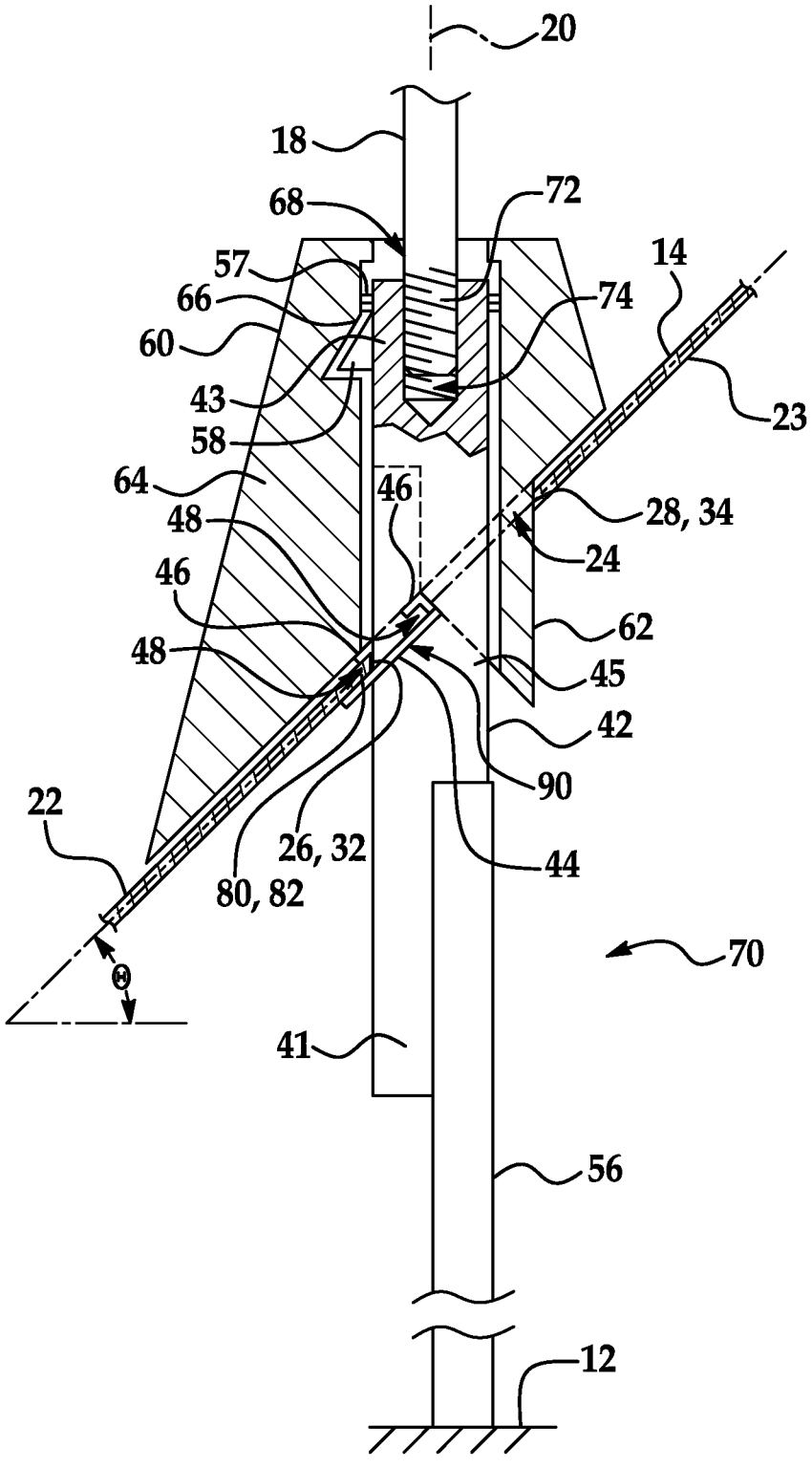


FIG. 7B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42
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22
26, 32
44
80, 82
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12

FIG. 8

ANTENNA MOUNTING ASSEMBLY FOR A VEHICLE WITH A SLOPED BODY PANEL

TECHNICAL FIELD

The embodiments disclosed herein generally relate to mounting assemblies used to support vehicle antennas.

BACKGROUND

Vehicle manufacturers may desire for a mast type antenna to extend in vertical orientation with respect to a fender or other body panel that forms a surface of a vehicle. In these applications, particularly where the surface of the vehicle is not normal to the axis of the antenna, vehicle manufacturers often provide an antenna mounting assembly configured for supporting the antenna with respect to the surface of the vehicle. Among other design considerations, it is desirable, for example, for such an antenna mounting assembly to include features for managing lateral forces acting on the antenna that arise during normal operation of the vehicle, for instance, through contact with strong winds, precipitation and car wash elements.

SUMMARY

Disclosed herein are embodiments of antenna mounting assemblies and vehicles that include such assemblies.

In one aspect, an antenna mounting base for supporting a vehicle antenna with respect to a vehicle body panel that defines a panel aperture comprises: an antenna mounting portion; a flange extending from a surface of the antenna mounting base; and at least one tab defining a recess with the flange, the recess being sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture.

In another aspect, a vehicle having a vehicle antenna comprises: a vehicle body structure supporting a body panel defining a panel aperture; and an antenna mounting base at least partially extending through the panel aperture and comprising: a vehicle body structure connecting portion connected to the vehicle body structure, an antenna mounting portion positioned adjacent an exterior surface of the body panel, and an intermediate portion having a flange extending therefrom, the intermediate portion supporting at least one tab to define a recess with the flange, the recess being sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture to couple the antenna mounting base to the body panel.

In yet another aspect, a vehicle having a vehicle antenna comprises: a vehicle body structure supporting a body panel defining a panel aperture, the panel aperture defined by a perimeter edge of the body panel, wherein the perimeter edge includes a first portion defining a small area portion of the panel aperture and a second portion defining a large area portion of the panel aperture; a longitudinal shaft at least partially extending through the panel aperture and comprising: a vehicle body structure connecting portion connected to the vehicle body structure, an antenna mounting portion positioned adjacent an exterior surface of the body panel, a flange extending from a partial circumferential portion of the shaft adjacent the first portion of the perimeter edge, and at least one tab to define a recess with the flange sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture; and a finisher having a base positionable about the panel aperture on the exterior surface of the body panel, the finisher having a projection configured to extend beyond the base through the panel aperture between the second portion of the perimeter edge and the shaft and contacting at least one of the shaft and the flange.

These and other aspects will be described in additional detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

The various features, advantages and other uses of the present apparatus will become more apparent by referring to the following detailed description and drawings in which:

FIG. **1** is a perspective view of a vehicle having an antenna mounting assembly for supporting a mast type antenna with respect to a sloped body panel;

FIG. **2**A is a side view of an antenna mounting base;

FIG. **2**B is a front view of the antenna mounting base;

FIG. **3** is a close up side view of the antenna mounting base showing details of a flange supporting a plurality of tabs;

FIG. **4** is a cross section view of the antenna mounting base taken along the line **4**-**4** in FIG. **2**B showing details of the flange and the plurality of tabs;

FIG. **5**A is a perspective view of the vehicle body panel showing a panel aperture defined therein configured for receiving the antenna mounting base;

FIG. **5**B is a plan view of the panel aperture defined by the body panel;

FIG. **6**A is a cross section view of the antenna mounting base taken at a position similar to line **4**-**4** in FIG. **2**B and showing details of installation through the panel aperture and to the body panel;

FIG. **6**B is a cross section view of the antenna mounting base taken at a position similar to line **4**-**4** in FIG. **2**B and showing further details of installation to the body panel;

FIG. **7**A is a cross section view of a finisher positionable about the antenna mounting base on an exterior surface of the body panel;

FIG. **7**B is a bottom view of the finisher; and

FIG. **8** is a partial cross section view of the antenna mounting assembly, including the antenna mounting base and the finisher, taken along the line **8**-**8** in FIG. **1**.

DETAILED DESCRIPTION

FIG. **1** depicts a vehicle **10** equipped with an antenna **18**. The vehicle **10** includes a body structure **12** configured to at least partially support one or more exterior body panels **14** of the vehicle **10**. The exemplary antenna **18** is shown as a mast type antenna oriented substantially vertically to extend from the body panel **14** along an axis **20**. As shown in FIG. **1**, the body panel **14** is a fender configured for framing a wheel well **16** of the vehicle **10**. However, it will be understood that the illustrated body panel **14** is given as a non-limiting example, and that the inventive aspects disclosed herein are applicable in principle to other body panels of the vehicle **10**. As explained in greater detail below, an antenna mounting assembly **40** is configured for supporting the antenna **18** with respect to the body panel **14**.

Due to design or other criteria for the vehicle **10** and/or the antenna **18**, an outer surface **22** of the body panel **14** may be shaped in such a way that the body panel **14** is not substantially perpendicular to the axis **20** at a position from which the antenna **18** extends. As shown, the antenna **18** extends from an oblique portion of the body panel **14** that is oriented with a predominantly vertical slope, while the antenna **18** extends from the body panel **14** in a substantially vertical orientation at an angle from a surface normal to the axis **20**. In such a design, it is desirable, for example, for the antenna mounting

assembly **40** to include features for managing lateral forces acting on the antenna **18** that arise during normal operation of the vehicle **10**. These forces may arise, for instance, through contact with strong winds, precipitation and car wash elements.

With further reference to FIGS. **2**A, **2**B and **8**, the antenna mounting assembly **40** can comprise an antenna mounting base **42**. The antenna mounting base **42** is generally configured to support the antenna **18** with respect to the body panel **14**, and optionally, with respect to the vehicle body structure **12**. The antenna mounting assembly **40** is suitable for supporting the antenna **18** where, as depicted in the Figures, the antenna **18** extends along the axis **20**, and the body panel **14** is disposed at an angle Θ from a surface normal to the axis **20** at a position from which the antenna **18** extends. As explained below, the antenna mounting base **42** includes features for managing different loads resulting from lateral or other forces acting on the antenna **18**.

As shown, the antenna mounting base **42** may be coupled between the vehicle body structure **12** and the body panel **14**, and is configured to provide a sturdy mounting point for the vehicle antenna **18**. In the embodiments incorporated herein, the antenna mounting base **42** extends at least partially through an aperture **24** defined by the body panel **14**. As depicted in FIGS. **2**A and **2**B, the antenna mounting base **42** includes an antenna mounting portion **43** and a vehicle body structure connecting portion **41**. The vehicle body structure connecting portion **41** is generally configured for connection to the body structure **12**. As shown, the vehicle body structure connecting portion **41** is configured to occupy a space **70** between the vehicle body structure **12** and an underside **23** of the body panel **14**. In one non-limiting example, the vehicle body structure connection portion **41** may be coupled directly to the vehicle body structure **12**. The vehicle body structure connection portion **41** may be welded, fastened, or adhered to the vehicle body structure **12**, for example, although other techniques may be used as desired. Alternatively, as shown, the antenna mounting assembly **40** can include an attachment bracket **56** configured for connecting the vehicle body structure connection portion **41** to the vehicle body structure **12**, and additionally can provide a grounding connection to the body structure **12**. The illustrated attachment bracket **56** can be connected at one end to the vehicle body structure connection portion **41**, and to one or more areas of the body structure **12** at a second end, for example, using the techniques set forth above.

The antenna mounting portion **43** is configured to provide a mounting point for the vehicle antenna **18**. In the illustrated example, the antenna mounting portion **43** defines a longitudinally extending threaded aperture **74** configured to receive external threads formed on a distal end **72** of the antenna **18**. In this example, the antenna mounting base **42** at least partially extends through the panel aperture **24** such that the antenna mounting portion **43** is accessible from an exterior side **22** of the body panel **14**, to permit selective installation or removal of the antenna **18** with respect to the antenna mounting base **42** by a user of the vehicle. It will be understood that this is provided as a non-limiting example, and that the antenna mounting portion **43** can include any other attachment mechanism to secure the illustrated or other antennas **18** to the antenna mounting base **42**.

As depicted in the embodiments in the Figures herein, the antenna mounting base **42** is generally configured as a longitudinally extending tubular shaft. As shown, the vehicle body structure connecting portion **41** is disposed on a first distal end of the antenna mounting base **42**, the antenna mounting portion **43** is disposed on an opposing second distal end, and the antenna mounting base **42** includes an intermediate portion **45** between the vehicle body structure connecting portion **41** and the antenna mounting portion **43**. The antenna mounting base **42** can extend coaxially with the antenna **18**, in the same substantially vertical orientation, as the axis **20**. The intermediate portion **45** is circumscribed by a portion **80** of the body panel **14** that borders the aperture **24** when the antenna mounting base **42** is in its final assembled position, as described in further detail below.

As shown in FIGS. **2**A and **2**B, the antenna mounting base **42** includes features for securing the antenna mounting base **42** to the body panel **14** when the antenna mounting assembly **40** is fully assembled to the vehicle **10**. The illustrated antenna mounting base **42** includes a retaining structure **90** located at the intermediate portion **45** of the antenna mounting base **42**. As shown, the retaining structure **90** comprises a flange **44** and one or more tabs **46** supported by the antenna mounting base **42**. The flange **44** extends radially from at least a partial circumferential portion of a surface of the antenna mounting base **42** at the intermediate portion **45**. As depicted in FIG. **2**A and FIG. **8**, the flange **44** can be oriented at the angle Θ with respect to a plane normal to the axis **20** of the antenna **18**, so that the flange **44** extends at an angle from the surface of the antenna mounting base **42** to generally lie parallel to a plane of the body panel **14**. The flange **44** is generally U-shaped and extends around approximately half the circumference, or 180 degrees, of the antenna mounting base **42**, although the flange **44** may be alternatively shaped and/or configured to support the one or more tabs **46**. As shown, the flange **44** is longitudinally disposed with respect to the antenna mounting base **42** for positioning in the space **70** between the vehicle body structure **12** and the body panel **14** in abutment with the underside **23** of body panel **14**. Furthermore, the flange **44** may be shaped to approximate a contour of the underside **23** of the body panel **14** to which the flange **44** abuts.

Turning now to FIGS. **3** and **4**, each tab **46** is explained in further detail. Each of the one or more tabs **46** is supported by the antenna mounting base **42** adjacent the intermediate portion **45** to define a recess **48** at least partially with the flange **44**. In one illustrated example, the tabs **46** may include a first wall **50** extending generally normally from the flange **44** from a position proximate to the antenna mounting base **42**, and a second wall **52** extending from a distal portion of the first wall **50** and substantially parallel to the flange **44**. As shown, the second wall **52** can additionally extend to, and optionally attach to, a surface of the intermediate portion **45** of the antenna mounting base **45**. In this example, the tabs **46** are supported by the antenna mounting base **42** via the flange **44**, and for each tab **46**, a recess **48** is defined between the flange **44** and the first and second walls **50** and **52** of the tab **46**. In another illustrated example, a tab **46** may include only a second wall **52** extending from the intermediate portion **45** of the antenna mounting base **42** to define a recess **48** between the flange **44**, the second wall **52** and the intermediate portion **45** of the antenna mounting base **42**. As explained below with reference to FIGS. **5**A, **5**B, **6**A and **6**B, the recesses **48** open towards one or more portions of a perimeter edge **30** of the panel aperture **24**, and may be sized and configured for receiving a portion **80** of the body panel **14** that borders the panel aperture **24** when the antenna mounting base **42** is in its final assembled position.

FIGS. **5**A and **5**B illustrate the panel aperture **24** that may be utilized by embodiments of the antenna mounting assembly **40** as described herein. The panel aperture **24** is defined by the body panel **14** and can be stamped, drilled, cut, or formed therein in any way known to those in the art. In general, the panel aperture **24** may be sized and shaped so that a portion **80**

of the body panel **14** bordering the panel aperture **24** seats within the recesses **48** in mateable engagement to couple the antenna mounting base **42** to the body panel **14**. In addition, the size and shape of the panel aperture **24** can accommodate installation of the antenna mounting base **42** during assembly of the vehicle **10**, as explained below.

A profile of the illustrated panel aperture **24** is generally defined by a perimeter edge **30** of the body panel **14** to include both a small area portion **27** and a large area portion **29**. The perimeter edge **30** includes first and second opposing concentric half circular segments **32** and **34**, which have different diameters and are interconnected by a pair of generally diametrically opposed radial segments **36** and **38**, as can be seen in FIG. **5**B. The small area portion **27** of the panel aperture **24** is defined by a first portion **26** of the perimeter edge **30**. The first portion **26** of the perimeter edge **30** includes the first half circular segment **32** and the pair of opposed radial segments **36** and **38**, and is configured for positioning into the recesses **48** of the one or more tabs **46**. The large area portion **29** is defined by a second portion **28** of the perimeter edge **30** that includes the second half circular segment **34**, which, as shown, has a relatively larger diameter than the first half circular segment **32**.

With additional reference to FIGS. **6**A and **6**B, it can be seen that the panel aperture **24** is sized and shaped to permit receipt of the antenna mounting portion **43** from the underside **23** of the body panel **14**, and to allow clearance for the tabs **46** to receive the portion **80** of the body panel **14** bordering the panel aperture **24**.

As shown in FIG. **6**A, the illustrated antenna mounting base **42** can be installed and attached to the body panel **14** by first inserting the antenna mounting portion **43** of the antenna mounting base **42** primarily through the large area portion **29** of the panel aperture **24**, from the underside **23** of the body panel **14**. The antenna mounting base **42** can be inserted until the second walls **52** of the tabs **46** rise through the panel aperture **24** and the recesses **48** formed by the tabs **46** and flange **44** are aligned with the first portion **26** of the perimeter edge **30**. The large area portion **29** is therefore sized to allow clearance for the antenna mounting base **42** and the one or more tabs **46** to pass through the panel aperture **24** during installation so that the antenna mounting base **42** can be moved toward the first portion **26** of the perimeter edge **30** until the first portion **26** of the perimeter edge **30** is positioned within the recesses **48** of the one or more tabs **46**.

Additionally, the flange **44** can be sized to contact the underside **23** of the body panel **14** while the antenna mounting base **42** and the one or more tabs **46** are passing through the panel aperture **24** to provide an indication that the one or more tabs **46** are in the correct positioning with respect to the panel aperture **24** to receive the first portion **26** of the perimeter edge **30** within the recesses **48** of the one or more tabs **46**, and to prevent the antenna mounting base **42** from moving past the correct position.

It can be seen from FIG. **6**B that the antenna mounting base **42** can then be moved translationally in a plane of the body panel **14** in a direction toward the small area portion **27** of the panel aperture **24** to move the recesses **48** towards the first portion **26** of the perimeter edge **30**. In the illustrated installed position, the antenna mounting base **42** is positioned such that the intermediate portion **45** of the antenna mounting base **42** seats against the first half circular segment **32** of the first portion **26** of the perimeter edge **30**, and such that the portion **80** of the body panel **14** bordering the first portion **26** of the perimeter edge **30** is received within the recesses **48**. Each of the tabs **46** are generally configured to receive the portion **80** of the body panel **14** bordering the first portion **26** of the perimeter edge **30** of the panel aperture **24** in mateable engagement within the respective recesses **48**. The one or more tabs **46** are thus configured to provide one or more points of contact with the body panel **14** to couple the antenna mounting base **42** to the body panel **14**. In general, these contact points collectively restrict movement of antenna mounting base **42** with respect to the body panel **14** and the panel aperture **24**. Additionally, these contact points may be configured so that the tabs **46** restrict rotation of the antenna mounting base **42** about the axis **20** within the panel aperture **24**.

In the embodiment shown throughout the Figures, the antenna mounting base **42** supports three tabs **46**, each providing a point of contact with the body panel **14**. The three tabs **46** are substantially equally spaced circumferentially with respect to each other along the flange **44**. A first tab **46** can be positioned at an apex of the flange **44**, to define with the flange **44** a first recess **48** configured for receiving a first part **82** of the portion **80** of the body panel **14** that borders the panel aperture **24**. In particular, the part **82** borders an apex of the first half circular segment **32** partially defining the first portion **26** of the perimeter edge **30** of the panel aperture **24**. A second tab **46** can be positioned proximate to a first distal end of the flange **44** to define with the flange **44** a second recess **48** configured for receiving a second part **84** of the portion **80** of the body panel **14** that borders the panel aperture **24**. Specifically, the second part **84** borders the radial segment **36** that partially defines the first portion **26** of the perimeter edge **30** of the panel aperture **24**. A third tab **46** can be positioned proximate to a second distal end of the flange **44** opposite the first end to define with the flange **44** a third recess **48** configured for receiving a third part **86** of the portion **80** of the body panel **14** that borders the panel aperture **24**. As shown, the third part **86** borders the radial segment **38** that partially defines the first portion **26** of the perimeter edge **30** of the panel aperture **24**.

As explained above, the tabs **46** can be differently supported by the antenna mounting base **42** depending, for example, on the position of a particular tab **46** with respect to the flange **44**. The first tab **46**, for instance, extends from the intermediate portion **45** of the antenna mounting base **42**, while the second and third tabs are supported by the antenna mounting base **42** via the flange **44**. While three tabs **46** are described in embodiments herein, it is also contemplated that a variety of numbers of tabs **46** may be formed, depending, for instance, on the amount and spacing of contact points to the body panel **14** that are desired. In addition, it will be understood that a single tab **46** could be configured to produce multiple contact points with the body panel **14**, if desired. Also, it will be understood that the antenna mounting base **42** and/or flange **44** could have a single tab **46** in a shape corresponding to a shape of the first portion **26** of the peripheral edge **30**.

The antenna mounting base **42** can be installed as directed above subsequent to attaching the antenna **18** to the antenna mounting portion **43**, or the antenna **18** can be attached after the antenna mounting base **42** is installed. Similarly, the antenna mounting base **42** can be installed with the attachment bracket **56** attached, or the two may be attached after the antenna mounting base **42** is installed.

As shown in FIGS. **7**A and **7**B, the antenna mounting assembly **40** can include a finisher **60**. The finisher **60** is generally configured to be positioned adjacent the exterior surface **22** of the body panel **14**. As shown, the finisher **60** defines an interior channel **68** configured to substantially receive and enclose the intermediate portion **45** and the antenna mounting portion **43** of the antenna mounting base

42. The finisher 60 is generally frustoconical in shape and extends longitudinally substantially along the axis 20. The finisher 60 can include a finisher base 64 tapered at the angle Θ to generally correspond with the slope of the oblique portion of the body panel 14, such that the finisher 60 can sit flush against the exterior surface 22 of the body panel 14 and substantially enclose the panel aperture 24 once installed.

The finisher 60 may be attached and retained to the antenna mounting base 42 through any reasonable means. As shown in FIG. 8, the finisher 60 is attached to the antenna mounting base 42 at or near the antenna mounting portion 43. In the illustrated example, the finisher 60 defines a pocket 66 in communication with the interior channel 68 that is sized and configured to receive a projection 58 positioned on the antenna mounting portion 43. Optional ridges 57 extend radially outward from the antenna mounting portion 43 to contact the finisher 60 in the interior channel 68 to provide a weatherproof seal between the finisher 60 and the antenna mounting base 42, as well as additional retention of the finisher 60.

During installation of the antenna mounting base 42 as described above, the large area portion 29 of the panel aperture 24 is partially vacated as the antenna mounting base 42 is moved toward the small area portion 27 to position the tabs 46 into engagement with the portion 80 of the body panel 14 bordering the first portion 26 of the perimeter edge 30 of the panel aperture 24. The illustrated finisher 60 includes a projection 62 that is configured to extend beyond the base 64 through the panel aperture 24 to occupy at least a portion of the vacated large area portion 29 following installation of the antenna mounting base 42. In particular, as shown in FIG. 8, the projection 62 is configured to occupy at least a portion of a space between the antenna mounting base 42 and the second portion 28 of the perimeter edge 30 of the panel aperture 24.

As shown in FIG. 8, the projection 62 is configured to inhibit movement of the antenna mounting base 42 away from the small area portion 27 of the panel aperture and into the large area portion 29, so that engagement of the portion 80 of the body panel 14 bordering the first portion 26 of the perimeter edge 30 of panel aperture 24 within the recesses 48 is maintained. To do so, the projection 62 can be configured to extend between and contact the perimeter edge 30 of the panel aperture 24 and at least one of the antenna mounting base 42 and one or more portions of the flange 44. The illustrated projection 62, for example, is contoured such that the projection 62 can be "sandwiched" between the antenna mounting base 42, the first and second distal ends of the flange 44, and the second portion 28 of the perimeter edge 30 defining the large area portion 29 of the panel aperture 24. Projection 62 can also be tapered, to aid insertion between the body panel 14 and antenna mounting base 42 and/or the flange 44. In FIG. 8, the projection 62 is shown to be tapered toward a distal end that is opposite the base 64 in a direction normal to the taper of the base 64. A surface extending along the taper of the projection 62 can contact the flange 44 as shown in FIG. 8, and slide along the flange 44 while the finisher 60 is installed onto the antenna mounting base 42, which pushes the projection 62 toward the second portion 28 of the perimeter edge 30 while also pushing the one or more tabs 46 of the flange 44 toward the first portion 26 of the perimeter edge 30 to provide a snug fit from the first portion 26 of the perimeter edge 30 through the flange 44, the antenna mounting base 42, and the projection 62 to the second portion 28 of the perimeter edge 30.

The finisher 60 as disclosed herein can be created as a single piece having the base 64, the projection 62, and the interior channel 68, otherwise the finisher may be composed of multiple components attached to one another. Furthermore, the base 64 or the whole finisher 60 can be composed of an elastomeric material sized to allow slight deformation during fitment within the panel aperture 24.

The first portion 26 of the peripheral edge 30 can form the small area portion 27 in any orientation within the panel aperture 24. However, it may be preferred to have the first portion 26 of the peripheral edge 30 form the small diameter portion 27 at the bottom of the panel aperture 24 such that the first walls 50 of the tabs 46 are oriented substantially above and over the first portion 26 of the peripheral edge 30. That way, the antenna mounting base 42 may be temporarily held in place through engagement of the tabs 46 to the portion 80 of the body panel 14 via gravity prior to installation of the finisher 60 onto the antenna mounting base 42.

While recited characteristics and conditions of the invention have been described in connection with certain embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under the law.

What is claimed is:

1. A vehicle having a vehicle antenna, comprising:

a vehicle body structure supporting a body panel defining a panel aperture, the panel aperture defined by a perimeter edge of the body panel, wherein the perimeter edge includes a first portion defining a small area portion of the panel aperture and a second portion defining a large area portion of the panel aperture the aperture extending at an oblique angle to an axis of the vehicle antenna; and

an antenna mounting base at least partially extending through the panel aperture and comprising:

a vehicle body structure connecting portion connected to the vehicle body structure,

an antenna mounting portion positioned adjacent an exterior surface of the body panel, and

an intermediate portion having a flange extending therefrom, the intermediate portion supporting at least one tab to define a recess with the flange,

the at least one tab extending downward at the oblique angle to the axis of the vehicle antenna,

the recess being sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture to couple the antenna mounting base to the body panel, and the recess being further configured for receiving a portion of the body panel bordering the small area portion of the panel aperture.

2. The vehicle of claim 1, wherein the flange extends from the antenna mounting base to abut an underside of the body panel.

3. The vehicle of claim 1, wherein the tab is comprised of a first wall extending from the flange adjacent the antenna mounting base through the panel aperture and a second wall extending from a distal portion of the first wall substantially parallel to the flange, in abutment with the exterior surface of the panel.

4. The antenna mounting assembly of claim 1, wherein the tab is comprised of a wall extending from the intermediate portion substantially parallel to the flange and in abutment with the exterior surface of the panel.

5. The vehicle of claim 1, wherein the flange extends from a partial circumferential portion of a surface of the antenna mounting base adjacent the first portion of the perimeter edge and includes first and second distal ends.

6. The vehicle of claim 5, wherein:
the intermediate portion supports a first tab between the first and second distal ends of the flange;
the flange supports a second tab proximate to the first distal end of the flange and a third tab proximate to the second distal end of the flange; and
each tab defines with the flange respective first, second and third recesses configured to receive different portions of the body panel bordering the first portion of the perimeter edge.

7. The vehicle of claim 6, wherein:
a profile of the panel aperture at the perimeter edge is defined by two opposing concentric half circular segments having different diameters and interconnected by a pair of opposed radial segments; and
the first portion of the perimeter edge includes a first of the half circular segments and the pair of opposed radial segments, and the second portion of the perimeter edge includes a second of the half circular segments having a relatively larger diameter than the first half circular segment.

8. The vehicle of claim 7, wherein the first recess is configured for receiving a portion of the body panel bordering an apex of the first of the half circular segments, the second recess is configured for receiving a portion of the body panel bordering a first of the radial segments, and the third recess is configured for receiving a portion of the body panel bordering a second of the radial segments.

9. The vehicle of claim 1, wherein the large area portion is larger than a width of the antenna mounting portion and the at least one tab.

10. The vehicle of claim 9, further comprising:
a finisher having a base positionable about the panel aperture on the exterior surface of the body panel, the finisher having a projection configured to extend beyond the base through the panel aperture between the second portion of the perimeter edge and the antenna mounting base and contacting at least one of the antenna mounting base and the flange.

11. A vehicle having a vehicle antenna, comprising:
a vehicle body structure supporting a body panel defining a panel aperture, the panel aperture defined by a perimeter edge of the body panel, wherein the perimeter edge includes a first portion defining a small area portion of the panel aperture and a second portion defining a large area portion of the panel aperture;
a longitudinal shaft at least partially extending through the panel aperture and comprising:
a vehicle body structure connecting portion connected to the vehicle body structure,
an antenna mounting portion positioned adjacent an exterior surface of the body panel,
a flange extending from only a partial circumferential portion of the shaft adjacent the first portion of the perimeter edge, and
at least one tab to define a recess with the flange sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture; and
a finisher having a base with a circumference positionable to surround the panel aperture on the exterior surface of the body panel, the finisher having a projection configured to extend beyond the base through the panel aperture between the second portion of the perimeter edge and the shaft and contacting at least one of the shaft and the flange.

12. A vehicle having a vehicle antenna, comprising:
a vehicle body structure supporting a body panel defining a panel aperture; and
an antenna mounting base at least partially extending through the panel aperture and comprising:
a vehicle body structure connecting portion connected to the vehicle body structure;
an antenna mounting portion positioned adjacent an exterior surface of the body panel; and
an intermediate portion having a flange extending therefrom, the intermediate portion supporting at least one tab to define a recess with the flange, the recess being sized and configured to mateably engage at least a portion of the body panel that borders the panel aperture to couple the antenna mounting base to the body panel;
wherein, the panel aperture is defined by a perimeter edge of the body panel, wherein the perimeter edge includes a first portion defining a small area portion of the panel aperture and a second portion defining a large area portion of the panel aperture;
the recess is configured for receiving a portion of the body panel bordering the first portion of the perimeter edge;
the flange extends from a partial circumferential portion of a surface of the antenna mounting base adjacent the first portion of the perimeter edge and includes first and second distal ends;
the intermediate portion supports a first tab between the first and second distal ends of the flange;
the flange supports a second tab proximate to the first distal end of the flange and a third tab proximate to the second distal end of the flange; and
each tab defines with the flange respective first, second and third recesses configured to receive different portions of the body panel bordering the first portion of the perimeter edge.

13. The vehicle of claim 12, wherein:
a profile of the panel aperture at the perimeter edge is defined by two opposing concentric half circular segments having different diameters and interconnected by a pair of opposed radial segments; and
the first portion of the perimeter edge includes a first of the half circular segments and the pair of opposed radial segments, and the second portion of the perimeter edge includes a second of the half circular segments having a relatively larger diameter than the first half circular segment.

14. The vehicle of claim 13, wherein the first recess is configured for receiving a portion of the body panel bordering an apex of the first of the half circular segments, the second recess is configured for receiving a portion of the body panel bordering a first of the radial segments, and the third recess is configured for receiving a portion of the body panel bordering a second of the radial segments.

15. The vehicle of claim 1, wherein the small area portion is lower than and outboard of the large area portion.

16. The vehicle of claim 11, wherein the projection contacts the perimeter edge and the at least one tab to maintain engagement of the at least one tab to the portion of the body panel that borders the panel aperture.

17. The vehicle of claim 16, wherein:
the at least one tab comprising:
a first tab at a first distal end of the flange, and
a second tab at a second distal end of the flange; and
the projection contacts the first tab and the second tab.

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